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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,407	06/13/2001	Zhongze Wang	MI22-1670	8493

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EXAMINER

PERKINS, PAMELA E

ART UNIT PAPER NUMBER

2822

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

4.7

# Office Action Summary

Application No.

09/881,407

Applicant(s)

WANG, ZHONGZE

Examiner

Pamela E. Perkins

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-5, 26-35 and 61-67 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-5 and 26-35 is/are allowed.
- 6) ☒ Claim(s) 61-67 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This office action is in response to the filing of the amendment on 20 December 2004. Claims, 1-5, 26-35 and 61-67 are pending.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 61-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chau (5,763,922) in view of Buchannan et al. (6,566,281).

Chau discloses a method of forming a transistor device where a silicon-comprising surface of silicon dioxide (402) is exposed to activate nitrogen to convert the silicon-comprising surface (402) to a material comprising silicon and nitrogen (416); the activated nitrogen being formed by exposing a nitrogen-containing precursor to a plasma maintained at a power of 500 watts to 2,000 watts; providing a channel region (230, 270) on one side of the silicon and nitrogen surface (220, 260); forming a plurality of PMOS (250) or NMOS (210) transistor gate structures on a side of the silicon and nitrogen surface (220, 260) opposed to the one side and forming a pair of source and drain regions (216, 256) separated from one another by the channel region (230, 270) (col. 3, line 4 thru col. 6, line 20).

Chau further discloses dividing the transistor gate structures into a first group and a second group and forming a mask (508) over the second group during the exposure step (Fig. 5D; col. 7, lines 33-63). Chau also discloses the plasma as a remote relative to the silicon-comprising surface and the plasma contacting the silicon-comprising surface (col. 6, line 67 thru col. 7, line 3). Chau discloses implanting a dopant into the channel region with a concentration between  $1 \times 10^{16}$  atoms/cm<sup>3</sup> to  $1 \times 10^{17}$  atoms/cm<sup>3</sup> (col. 5, lines 48-65). Chau does not disclose the activated nitrogen forming a peak concentration of at least 15 atomic %.

Buchanan et al. disclose a method of forming a transistor device where a silicon-comprising surface is exposed to activate nitrogen to convert the silicon-comprising surface to a material comprising silicon and nitrogen (col. 7, lines 48-67). Buchanan et al. further disclose the activated nitrogen having a concentration of about 15 atomic % (col. 8, lines 1-10).

Since Chau and Buchanan et al. are both from the same field of endeavor, a method of forming a transistor device, the purpose disclosed by Buchanan et al. would have been recognized in the pertinent art of Chau. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Chau by the activated nitrogen having a concentration of about 15 atomic % as taught by Buchanan et al. to prevent diffusion into the substrate (col. 3, lines 26-51).

***Allowable Subject Matter***

Claims 1-5 and 26-35 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: prior art does not anticipate, teach, or suggest exposing the substrate surface to activated nitrogen to increase a peak nitrogen concentration within the substrate surface by at least about 15 atom percent.

### ***Response to Arguments***

Applicant's arguments, filed 20 December 2004, with respect to claims 1-5 and 26-25 have been fully considered and are persuasive. The rejection of claims 1-5 and 26-35 has been withdrawn.

Applicant's arguments filed 20 December 2004, with respect to claims 61-67 have been fully considered but they are not persuasive. As stated above, Chau in view of Buchanan et al. disclose the method of forming a plurality of transistor devices as described in claims 61-67.

In response to the applicant's arguments, the applicant argues prior art does not teach incorporating at least 15 atom% nitrogen into the surface of a substrate by exposing the surface to activated nitrogen. However, Buchannan et al. disclose a method of forming a transistor device where a silicon-comprising surface is exposed to activate nitrogen to convert the silicon-comprising surface to a material comprising silicon and nitrogen (col. 7, lines 48-67). Buchannan et al. further disclose the activated nitrogen having a concentration of about 15 atomic % (col. 8, lines 1-10).

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E. Perkins whose telephone number is (571) 272-1840. The examiner can normally be reached on Monday thru Friday, 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PEP



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